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(56) Documents Cited

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(54) Abstract Title

A microwave oven having a guide for discharging gas which includes exhaust means which protrude through the ovens outer casing

(57) A microwave oven has a cavity casing 15 forming a cooking chamber and an outer casing 3 enclosing the cavity casing 15. The cavity casing 15 has discharge holes 39 for discharging gas in the cooking chamber. The discharged gas is passed into a guide member 41 which is installed between the cavity casing 15 and the outer casing 3. A discharge guide member 47, 57, or exhaust means, having an opening 47a, 57a for discharging the gas guided by the guide member 41, is formed either on the outer casing 3 or on the guide member 41. Attachment of the guide member 41 to the cavity casing 15 is maintained by support from the outer casing 3 which pushes the guide member 41 against the cavity casing wall 15.

FIG . 1

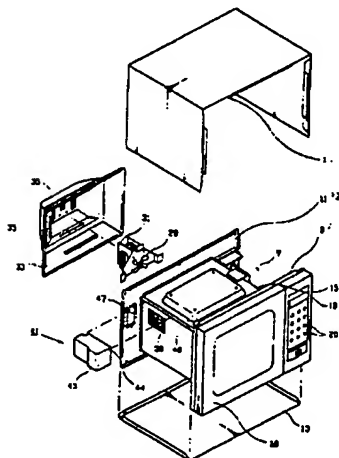


FIG . 3

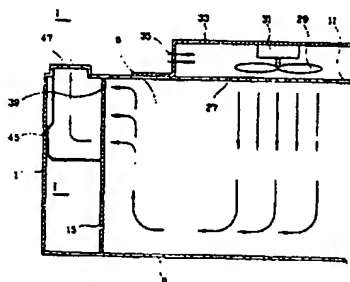
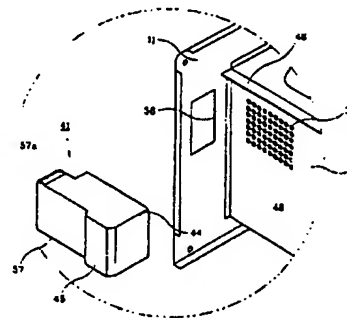


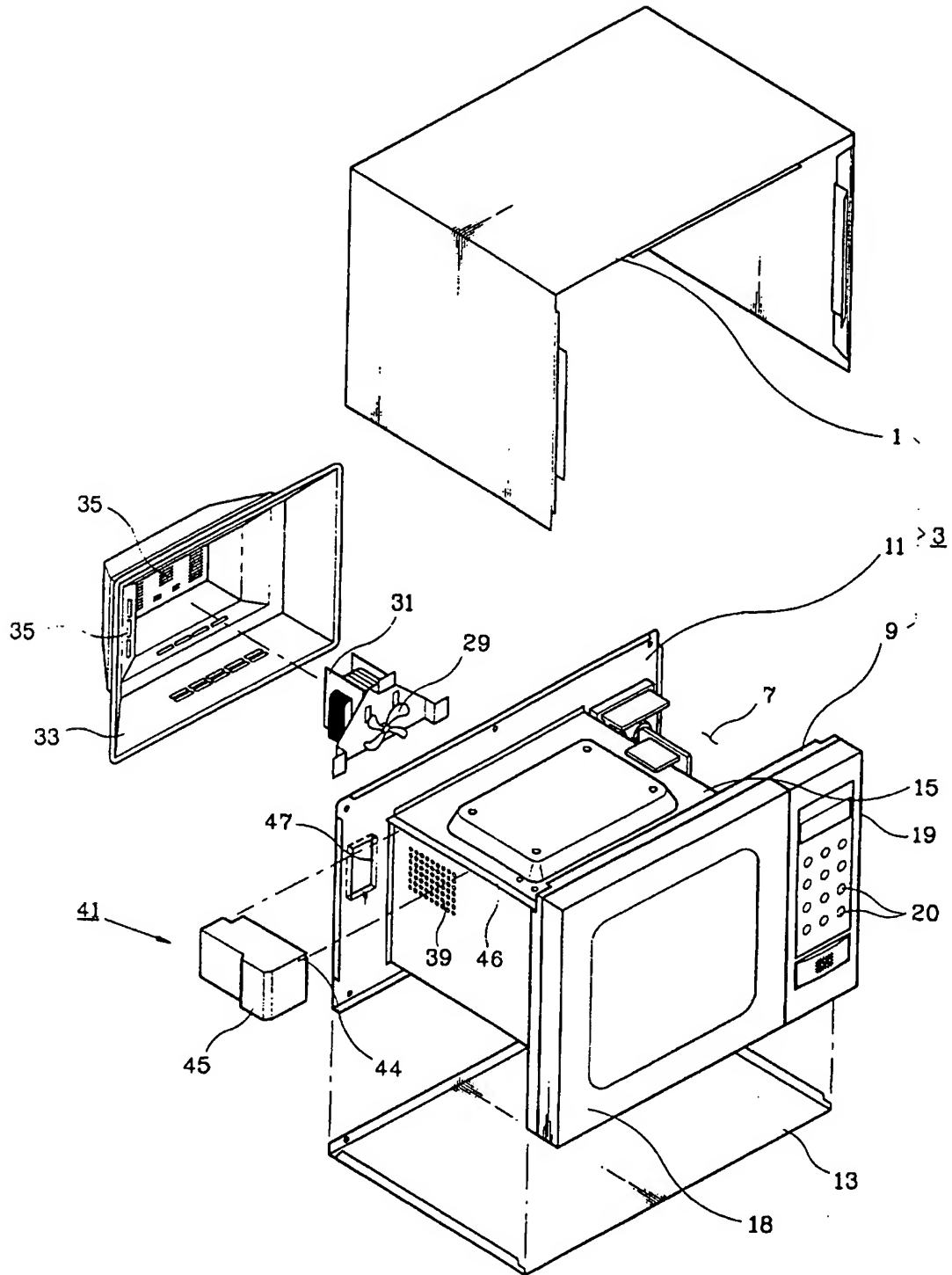
FIG . 5



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FIG. 1



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FIG . 2

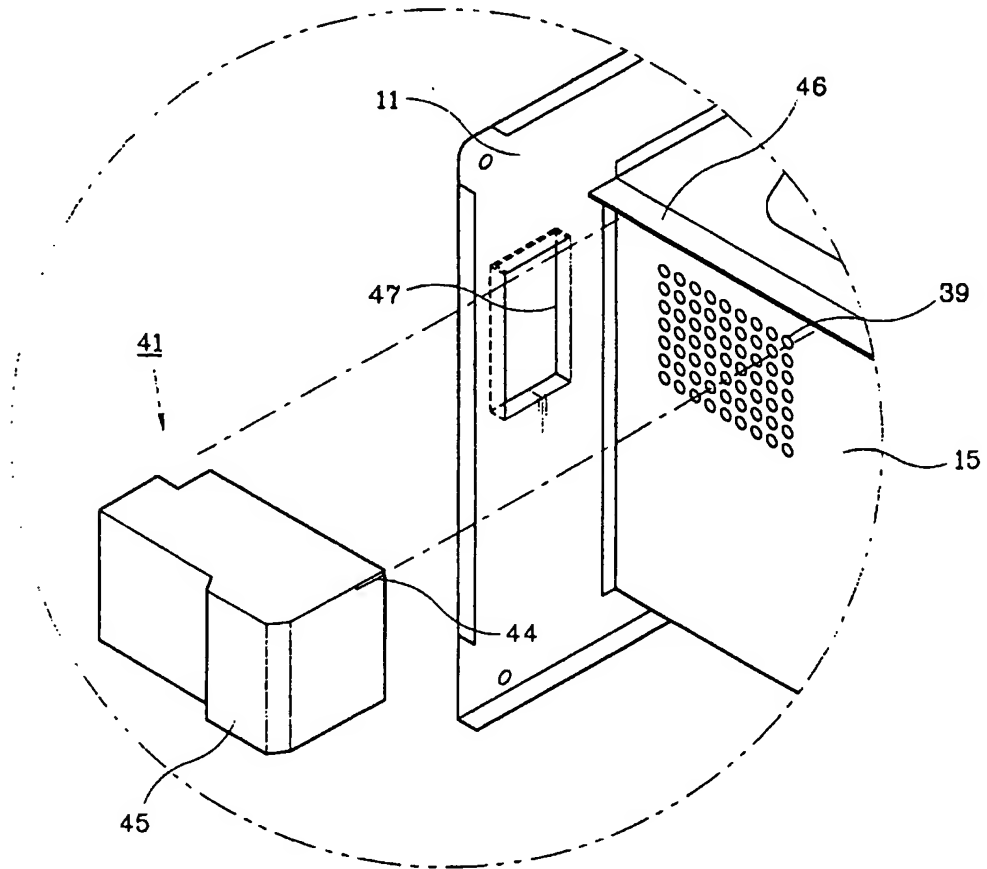


FIG. 3

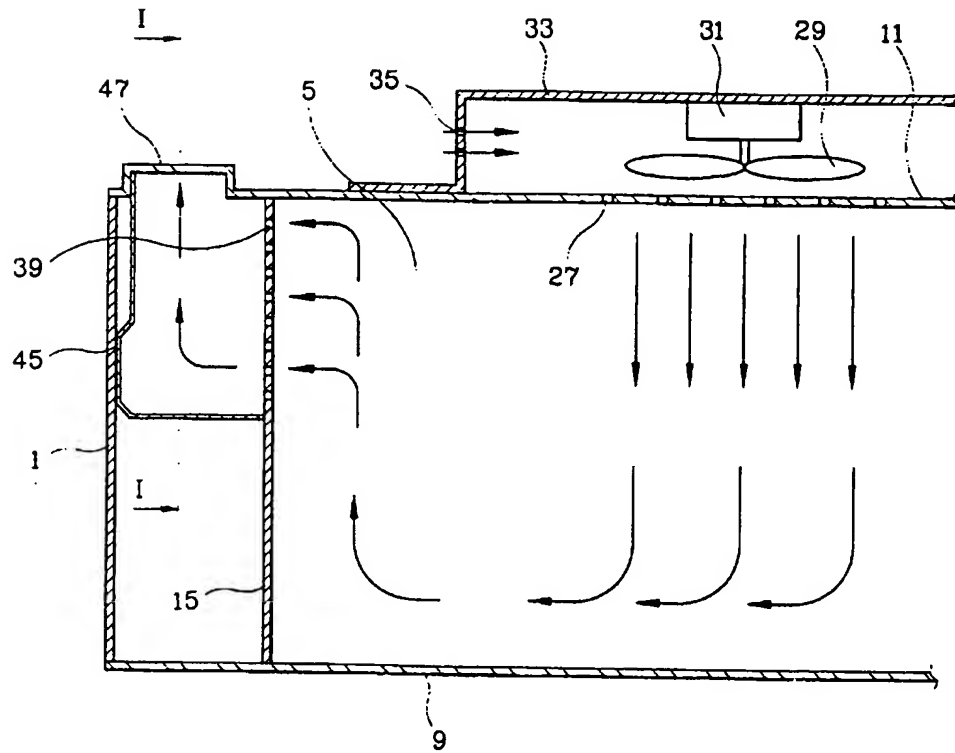
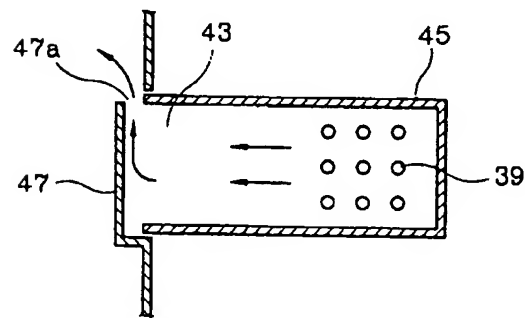


FIG. 4



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FIG . 5

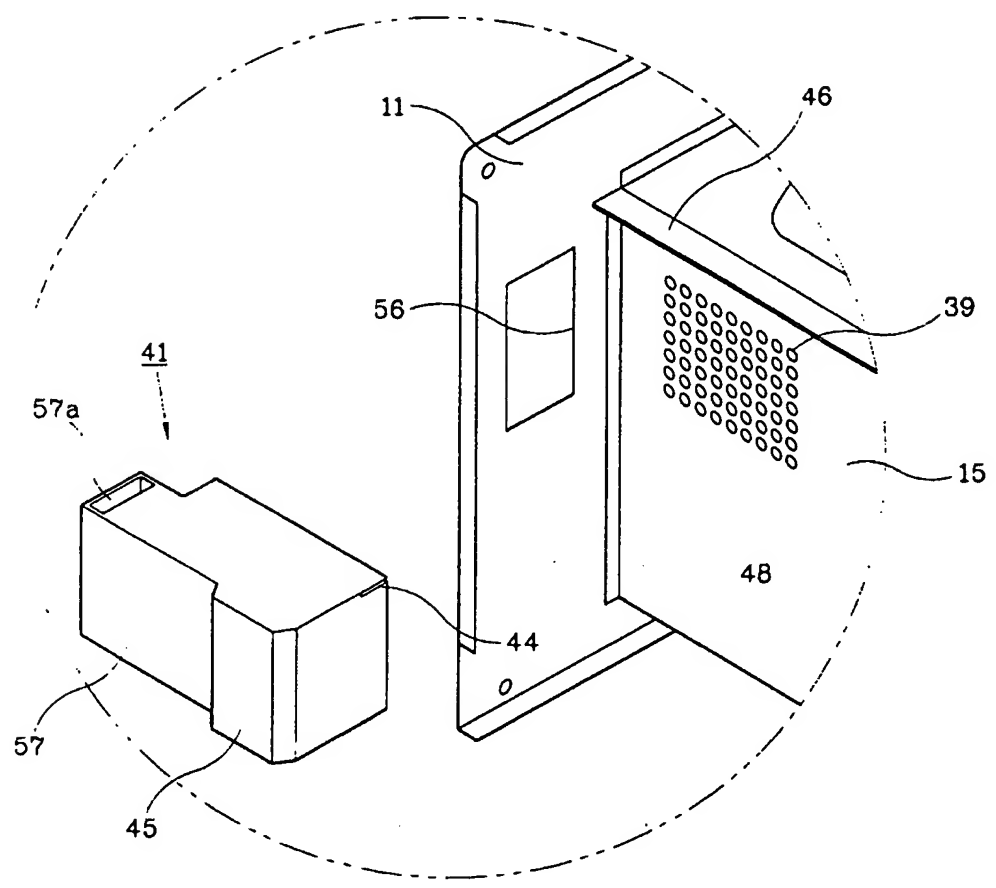
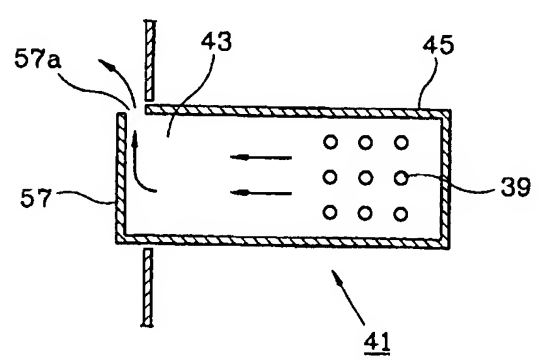
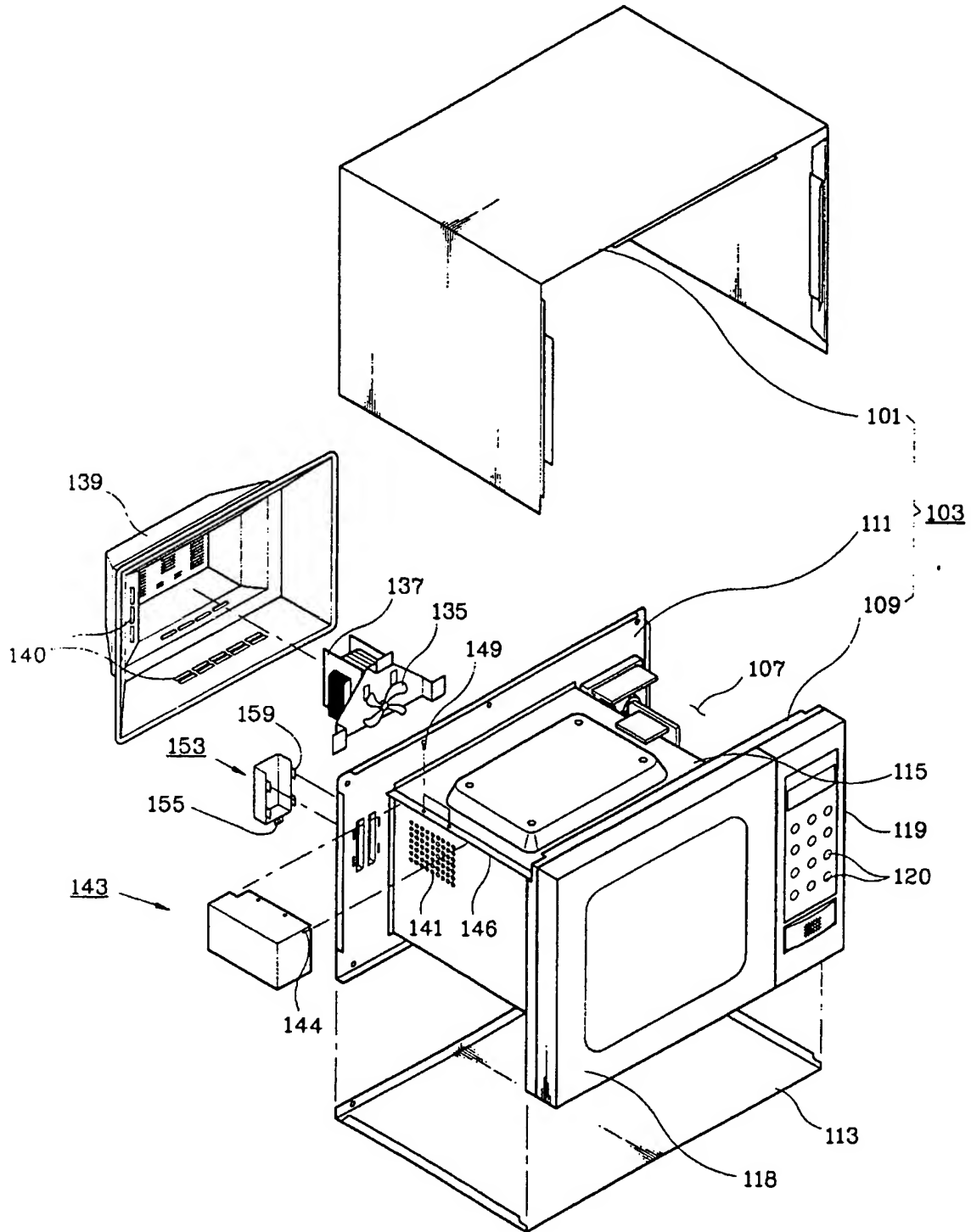


FIG . 6



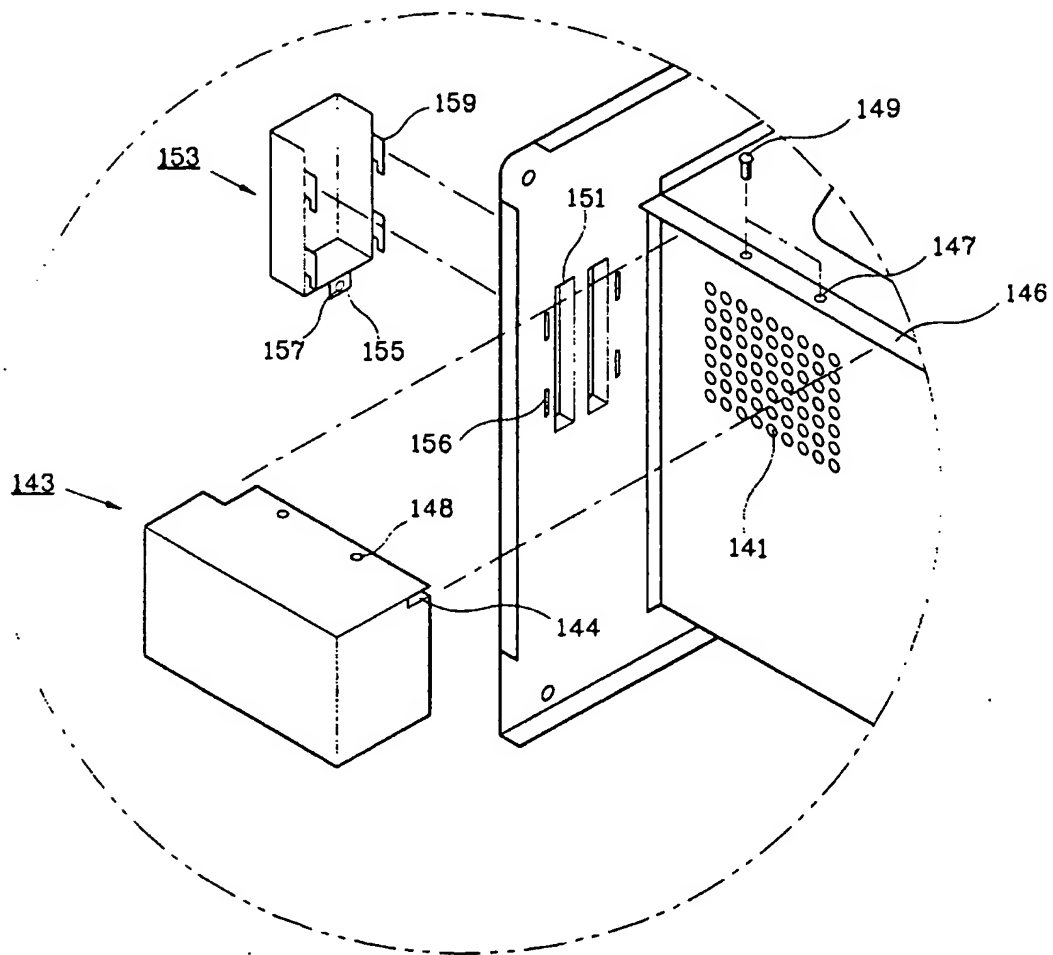
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FIG. 7
(PRIOR ART)



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FIG. 8
(PRIOR ART)



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Microwave Oven Having A Guide Member For Discharging Gas

Description

The present invention relates to a microwave oven.

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Figures 7 and 8 show a conventional microwave oven. The microwave oven has a casing 115 forming a cooking chamber (not shown) and an outer housing 103. The outer housing 103 comprises a front panel 109 and a rear panel 111 attached to the front and the rear sides of the casing 115 respectively, an upper panel 101 enclosing the upper and the side faces of the casing 115, and a bottom panel 113 installed under the lower face of the casing 115. A cooking chamber door 118 is mounted to the front panel 109 and a control panel 119, having a plurality of operating buttons 120 for controlling operation of the microwave oven, is provided on the right part of the front panel 109.

15 A electrical component chamber 107 is provided to one side of the casing 115. Electrical components, including a magnetron and a cooling fan, are located in the electrical component chamber 107..

A radiant heater (not shown) for heating food is installed in the cooking chamber and a convection motor casing 139 is installed on the back of the rear panel 111. A convection fan 135 and a convection motor 137 for driving the convection fan 135 are installed in the convection motor casing 139. The convection motor casing 139 has a plurality of in-flow holes 140 and the rear paneel 111 has a plurality of out-flow holes (not shown). While the convection fan 135 is being rotated by the convection motor 137, outside air is drawn into the convection motor casing 139 through the in-flow holes 140 and is then blown into the cooking chamber through the out-flow holes.

A plurality of gas discharge holes 141, for discharging gas from the cooking chamber, are formed in a side of the casing 115. An inner guide member 143 is mounted to the cavity casing 115. The inner guide member 143 provides a discharge passage for gas discharged through the discharge holes 141.

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The cavity casing 115 has a flange 146 at its left upper edge and the inner guide member 143 has a cutaway part 144 for assembly with the flange 146. The inner guide member 143 and the flange 146 have holes 148 on their upper sides and screw holes 147 corresponding to respective screw holes 148. The inner guide member 143 is fixed on the cavity casing
5 115 so that the flange 146 is engaged with the cutaway part 144. Screws 149 are inserted into the screw holes 147 through the screw holes 148. The inner guide member 143 is fixed to the cavity casing 115.

The rear panel 111 has exhaust holes 151 for exhausting gas guided by the inner guide
10 member 143. The exhaust holes 151 are assembled with the outlet of the inner guide member 143.

An outer guide member 153 is mounted to the back of the rear panel 111. The outer guide member 153 has a plurality of assembly protrusions 159 which are received by assembly
15 holes 156 formed in the rear panel 111. The outer guide member 153 has a flange 155 formed with a screw hole 157. The outer guide member 153 is fixed to the rear plate 111 by a screw (not shown) screwed into the rear panel 111 through the screw hole 157.

When a food to be cooked is accommodated in the cooking chamber, the magnetron
20 radiates microwaves into the cooking chamber and the heater directly heats the food. In the course of cooking, the air blown into the cooking chamber by the convection fan 135 is convected in the cooking chamber, and such gas such as steam or smoke generated during cooking is discharged into the inner guide member 143 through the discharge holes 141. Then, the gas is discharged to the rear of the microwave oven through the outer guide
25 member 153.

However in such a conventional microwave oven, since the inner guide member 143 and the outer guide member 153 have to be fixed to the casing 115 and the rear panel 111, respectively, a lot of time and effort is consumed in assembling them.

30

According to the present invention, there is provided a microwave oven comprising including a discharge conduit for guiding gas, discharged through hole in a cooking chamber wall, towards the outside of the oven through an external panel thereof, and

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exhaust means for directing discharging gas outside the oven, wherein the exhaust means does not comprise a device mounted externally to said panel.

5 The exhaust means may comprise an outwardly bulging portion of said panel, the bulging portion being open at its top or an end of the conduit projecting through a hole in said panel, said end being closed except for an opening in its top.

Preferably, such a microwave oven includes a ventilation fan mounted on the outside of said panel for driving air into the cooking chamber and the exhaust means is configured for
10 exhausting gas in a direction transverse to the air flow generated by the ventilation fan.

Embodiments of the present invention will now be described, by way of example, with reference to Figures 1 to 6 of the accompanying drawings, in which:

Figure 1 is an exploded perspective view of a first microwave oven according to the present
15 invention;

Figure 2 is an enlarged view of Figure 1;

Figure 3 is a transverse sectional view of the oven of Figure 1 in its assembled state;

Figure 4 is a sectional view of Figure 3 taken along the line I-I;

Figure 5 is a partial exploded perspective view of a second microwave oven according to
20 the present invention;

Figure 6 is a transverse sectional view of the oven of Figure 5 in its assembled state;

Figure 7 is an exploded perspective view of a conventional microwave oven; and

Figure 8 is a partial enlarged view of Figure 5.

25 Referring to Figures 1 to 4, a microwave oven has a casing 15 forming a cooking chamber (not shown) and an outer housing 3. The outer housing 3 comprises a front panel 9 and a rear panel 11 attached to the front and the rear sides of the casing 15, respectively, an upper panel 1 enclosing the upper and the side faces of the casing 15, and a bottom panel 13 under the casing 15.

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A cooking chamber door 18 is mounted to the front plate 9 and a control panel 19, having a plurality of operating buttons 20 for controlling operation of the microwave oven, is provided in the righthand part of the front panel 9.

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A electrical component chamber 7 is provided to one side of the casing 15. Electrical compnents, including a magnetron, a high-voltage transformer, a high-voltage and a cooling fan, are located in the electrical component chamber 7. The microwaves generated
5 by the magnetron are guided into the cooking chamber 5 by a waveguide (not shown).

A radiant heater (not shown) for heating food is installed in the cooking chamber 5 and a convection motor casing 33 is mounted to the back of the rear panel 11. A convection fan 29 and a convection motor 31 for driving the convection fan 29 are housed in the
10 convection motor casing 33. The convection motor casing 33 has a plurality of in-flow holes 35 and the rear panel 11 has a plurality of out-flow holes 27. Whn the convection fan 29 is being rotated by the convection motor 31, outside air is drawn into the convection motor casing 33 through the in-flow holes 35 and is then blown into the cooking chamber 5 through the out-flow holes 27.

15 A plurality of discharge holes 39 are formed in a side of the casing 15 for discharging gas from the cooking chamber 5. A guide member 41 is mounted to the casing 15 to provide a discharge passage for the gas discharged through the discharge holes 39.

20 The guide member 41 is mounted to the casing 15 between the outer housing 1 and the casing 15 and adjacent to the discharge holes 39. The guide member 41 is substantially of the form of a rectangular barrel and the parts contacting the casing 15 and the rear panel 11 are open.

25 The cavity casing 15 has a flange 46 formed at its upper left edge and the guide member 41 has a cutaway part 44 assembled with the flange 46. When the flange 46 is inserted into the cutaway part 44, the guide member 41 is assembled into the cavity casing 15.

An outwardly protruding protrusion part 45 is formed the outside of the guide member 41.
30 The width W of the guide member 41 in the region of the protrusion part 45 is almost the same as the distance between the casing 15 and the outer housing 1. Therefore, as shown in Figure 3, the outer side of the protrusion part 45 is in contact with the inside of the outer housing 1 so that the guide member 41 is pushed by the outer housing 1 toward the

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casing 15 so that assembled state of the assembly protrusions 46 and the assembly recesses 48 is maintained.

5 A discharge guide part 47 is integrally formed with the rear panel 11. The discharge guide part 47 is recessed on the inside of the rear panel 11 so as to protrude backwards from the rear panel 11. The edge of the outlet of the guide member 41 is accommodated 47 in the discharge guide part 47 as shown in Figures 3 and 4 so that the discharge guide part 47 is assembled with the outlet of the guide member 41.

10 The discharge guide part 47 is formed with an opening 47a at an edge thereof so that the gas guided by the guide member 41 is discharged through it. Preferably, the opening 47a is formed so that the discharge direction of the gas is transverse to the blowing direction of the convection fan 29, and more preferably, as shown in Figure 4, the opening 47a is open upward by cutting the upper edge of the recessed section. Therefore, the gas is discharged
15 upwards through the discharge guide part 47 so that the discharged gas is not drawn again into the cooking chamber 5 by the convection fan 29.

The recessed section of the discharge guide part 47 can be formed by drawing and the opening 47a is formed by cutting.

20

When food to be cooked is in the cooking chamber 5, the magnetron radiates microwaves into the cooking chamber 5 and the heater then heats the food. In the course of cooking, the air blown into the cooking chamber 5 by the convection fan 29 is convected in the cooking chamber 5, and gas such as vapour, steam or smoke generated during cooking
25 flows into the guide member 41 through the discharge holes 39. Then, the gas is discharged upwards in the rear of the microwave oven through the discharge guide part 47.

The guide member 41 can be simply installed by assembling the edge of the outlet into the discharge guide part 47 and then assembling the cutaway part 44 into the flange 46. As the
30 outer housing 1 is assembled with the inner casing 3, the deviation of the guide member 41 is prevented by the outer housing 1 contacting with the protrusion part 45. Therefore, the guide member 41 is fixed to the casing 15 without additional fixing members such as

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screws and an additional process for fixing the guide member 41 onto the casing 15 is not required.

Referring to Figures 5 and 6, the discharge guide part 57 is formed on an outlet end of the
5 guide member 41 integrally with the guide member 41. The rear panel 11 has an assembly
hole 56 having a shape identical to the cross section of the guide member 41, and the
discharge guide part 57 is inserted into the assembly hole 56. Accordingly, as the guide
member 41 is assembled with the assembly hole 56, the discharge guide part 57 protrudes
backwards from the rear plate 11.

10

The discharge guide part 57 has an opening 57a on one of its edges so that gas guided by
the guide member 41 is discharged outwards. As described above, the opening 57a is
formed on the upper portion of the discharge guide part 57. Since the discharge guide part
57 is formed integrally with the guide member 41, the number of components is reduced
15 and the assembly process becomes simple.

Since, in the foregoing embodiments, the discharge guide part 47 or 57 is formed integrally
with either the rear panel 11 or the guide member 41, the number of components is
reduced and the assembly process is simplified. Furthermore, since the discharge guide
20 part 47 discharges gas in the cooking chamber 5 upwards, the discharged gas is not drawn
again into the cooking chamber 5. Since the guide member 41 is supported by the outer
housing 1, an additional process for fixing the guide member 41 is not needed, and the
assembly process is simplified.

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Claims

1. A microwave oven comprising including a discharge conduit for guiding gas,
discharged through hole in a cooking chamber wall, towards the outside of the oven
5 through an external panel thereof, and exhaust means for directing discharging gas outside
the oven, wherein the exhaust means does not comprise a device mounted externally to
said panel.
2. An oven according to claim 1, wherein the exhaust means comprises an outwardly
10 bulging portion of said panel, the bulging portion being open at its top.
3. An oven according to claim 1, wherein the exhaust means comprises an end of the
conduit projecting through a hole in said panel, said end being closed except for an
opening in its top.
15
4. An oven according to claim 1, 2 or 3, including a ventilation fan mounted on the
outside of said panel for driving air into the cooking chamber, wherein the exhaust means
is configured for exhausting gas in a direction transverse to the air flow generated by the
ventilation fan.
20
5. A microwave oven comprising:
a cavity casing forming a cooking chamber and having discharge holes at a side
thereof for discharging gas in the cooking chamber;
an outer casing enclosing the cavity casing to form an external appearance;
25 a guide member installed between the cavity casing and the outer casing, the guide
member for providing a discharge passage for the gas discharged through the discharge
holes; and
a discharge guide part recessed in an inside of the outer casing so as to protrude
outward of the outer casing, the discharge guide part being assembled with an outlet of the
30 guide member, wherein an edge of the discharge guide part is cut, to form an opening for
discharging the gas guided by the guide member.

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6. The microwave oven as claimed in claim 5, wherein a convection fan for blowing air into the cooking chamber is installed on an outer side of the outer casing, and the discharge guide part discharges the gas through the opening in a direction transverse to a blowing direction of the convection fan.

5

7. The microwave oven as claimed in claim 6, wherein the opening is formed at an upper edge of the discharge guide part to discharge the gas upward.

8. The microwave oven as claimed in claim 5, wherein the cavity casing has a flange
10 and the guide member has a cutaway part assembled with the flange.

9. The microwave oven as claimed in claim 8, wherein the guide member is pushed by the outer casing so that assembling state of the assembly protrusion and the assembly recess is maintained.

15

10. A microwave oven comprising:

a cavity casing forming a cooking chamber and having discharge holes at a side thereof for discharging gas in the cooking chamber;

an outer casing enclosing the cavity casing to form an external appearance;

20 a guide member installed between the cavity casing and the outer casing, the guide member for providing a discharge passage for the gas discharged through the discharge holes; and

a discharge guide part formed on an end of the guide member in a single body with the guide member, the discharge guide part passing through the outer casing to protrude
25 outward of the outer casing, wherein an edge of the discharge guide part is cut, to form an opening for discharging the gas guided by the guide member.

11. A microwave oven substantially as hereinbefore described with reference to Figures 1 to 4.

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12. A microwave oven substantially as hereinbefore described with reference to Figures 5 and 6.



The
Patent
Office
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Application No: GB 9827848.4
Claims searched: 1-10

Examiner: Ruth Patterson
Date of search: 23 June 1999

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): H5H (HMF, HMFV, HMD, HMX); F4W (W18A1, W18Z, W32, W2D1, W2Z)

Int CI (Ed.6): F24C (7/02, 15/00, 15/20); H05B (6/64, 6/80)

Other: Online (WPI, IFIPAT, JAPIO)

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0767598 A2 (SAMSUNG) See figure 5	1
X	EP 0248580 A2 (TOSHIBA) See abstract and figure 1	1
A	US 5673681 A (GREENHECK FAN CO.) See figures 1 & 3	
X	US 4354084 A (BOSCH SIEMENS) See abstract and figure 1	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.